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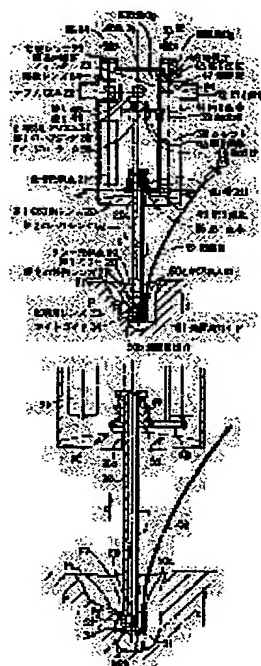
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(54) MICROSCOPE FOR OPERATION

(57)Abstract:

PURPOSE: To improve the efficiency when an operation is conducted while observing an operated part by matching the directions of respective observing means for making observations through the same ocular part with an image direction correcting means and properly switching a microscope image and an endoscope image on the microscope.

CONSTITUTION: When a 2nd housing 32 is rotated, a 1st gear 36 also rotates since the projections of the 1st gear 36 engage the groove, and its rotation is transmitted to a 5th gear 43 through a 2nd gear 40, a shaft 38, and a 3rd gear 41 and also transmitted to a 6th gear 45 through a 4th gear 42. Here, the rotation ratio of the 1st gear 36 and 5th gear 43 is set to 2:1 and an image rotator 30 incorporated in the 5th gear 43 is rotated by invariably a half in the same direction with the 2nd housing 32. Consequently, an image which is made incident on a 2nd objective 27 and observed in the eyes 54 of the operator through an ocular 25 is corrected so that the surface layer side shown by an arrow (d) is always in a certain direction of the visual field of a 1st observation means.



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CLAIMS

[Claim(s)]

[Claim 1] The 2nd observation means which shares the eye contacting part of said 1st observation means while observing the part of said observed body in the condition that the sense which observes an observed body with the 1st observation means which consists of the observation optical system for observing the way section, and this 1st observation means differs either [at least] from a location, The operation microscope characterized by providing a direction amendment means of an image to amend so that the sense of the observation image of the observed body in said eye contacting part obtained with a scrolling means to change the line of sight of this 2nd observation means, and said 2nd observation means may be maintained at the predetermined sense.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the operation microscope used for micro surgery.

[0002]

[Description of the Prior Art] In order to raise the certainty of the operation using a stereoscopic microscope in recent years, with the operation microscope, it considers performing unobservable observation to the so-called dead angle part using an endoscope. It is desirable that a microscope image and an endoscope image can be changed and observed in the operation of such a method. For this reason, a microscope which is indicated by the JP,62-134615,A official report and the JP,3-105305,A official report is proposed.

[0003] Here, signs that the way section is observed using the operation microscope equipment indicated by JP,3-105305,A are shown in drawing 10. The rough configuration of this is as follows. That is, in drawing 10, 1 is an endoscope and this comes to have an objective lens 2 and the ocular 3 which observes the image incorporated with this objective lens 2. The observation image of this endoscope 1 is incorporated by the operation microscope 13 later mentioned with the image transmission equipment 4, and is observed from the eye contacting part of that operation microscope 13. The image transmission equipment 4 is equipped with the 1st relay lens 5, mirrors 6, 7, and 8, and the 2nd relay lens 9, and is constituted, and the view image pick-up by the endoscope 1 is led to the below-mentioned operation microscope 13. Moreover, the attachment 10, 11, and 12 connected rotatable is formed in the location like illustration at the circumference of the observation optical axis from an endoscope 1, respectively in the middle of two or more joint cylinder part material which can be set to the image transmission equipment 4, and the location and sense of an endoscope 1 are supported free [modification] by this. The operation microscope 13 consists of an objective lens 14, the variable power optical system 15 of a pair, the half prism 16, an image formation lens 17, and an ocular 18.

[0004] When observing the way section P using such operation microscope equipment, it is the surface P1 of the way section P. Image formation is carried out through an objective lens 14, the variable power lens 15, the half prism 16, and the image formation lens 17, and it is further observed optically by a way person's eye 19 through an ocular 18.

[0005] On the other hand, in observing the deep part of the way section P with the difficult observation which leads a microscope 13, or its side face P2, using an endoscope 1, it carries out, i.e., image formation of the visual field image is incorporated and carried out to the image formation lens 17 of an eye contacting part through an objective lens 2, an ocular 3, the image transmission equipment 4, and the half prism 16, and it observes through the ocular 18 of a microscope 13. Here, if a protection-from-light member is arranged between the variable power optical system 15 and the half prism 16 and between the 2nd relay lens 9 and the half prism 16 and this is opened and closed by turns, an operation microscope image and an endoscope image can be changed. Thus, the certainty of an operation can be raised by carrying out sequential observation of the two images.

[0006]

[Problem(s) to be Solved by the Invention] By the way, although the operation microscope equipment which JP,3-105305,A is shown observes an endoscope image through the ocular 18 of the microscope Since the endoscope image observed rotates to the circumference of the optical axis of the image transmission equipment 4, it is not known at all whether it hits a part for the deep part flank shown by that the image to observe hits a part for the surface flank shown in the thing of which part of the way section, and drawing 10 by the arrow head a, or the arrow head b. For this reason, even if the dead angle part was observable, the way person pictured anatomy to himself, had forced decision of that direction a surface and deep part side, and had the situation of reducing the efficiency of an operation considerably.

[0007] Since the physical relationship on the anatomy of the observation image by the 1st observation means and the observation image by the 2nd observation means can be grasped easily, the place which this invention was made paying attention to said technical problem, and is made into the purpose is to offer the operation microscope which can raise the efficiency at the time of undergoing an operation while a microscope image and an endoscope image are changed suitably and the way section observes under the microscope.

[0008]

[Means for Solving the Problem and its Function] The 1st observation means which consists of observation optical system for this invention to observe the way section, The 2nd observation means which shares the eye contacting part of said 1st observation means while observing the part of said observed body in the condition that the sense which observes an observed body with this 1st observation means differs either [at least] from a location, It is the operation microscope characterized by providing a direction amendment means of an image to amend so that the sense of the observation image of the observed body in said eye contacting part obtained with a scrolling means to change the line of sight of this 2nd observation means, and said 2nd observation means may be maintained at the predetermined sense. In order to adjust the sense of each observation means to observe from the same eye contacting part, with the direction amendment means of an image, the efficiency at the time of undergoing an operation improves.

[0009]

[Example]

The 1st example of this invention is explained with reference to <1st example> drawing 1 thru/or drawing 4 . The sectional view where the sectional view and drawing 3 to which the part of the 2nd housing 32 incorporating the 2nd observation means expanded the general drawing of the mirror body with which drawing 1 builds in the observation optical system of an operation microscope, and drawing 2 meet A-A in drawing 1 , and drawing 4 are the top views of an index plate.

(Configuration) The stereoscopic microscope for an operation shown in drawing 1 has the 1st observation means which consists of the 1st objective lens 20, the variable power optical system 21 of a pair, the half prism 22, the brightness amendment filter 23, an image formation lens 24 of a pair, and an ocular 25 of a pair, and this 1st observation means is built in the 1st housing 26. Moreover, the 2nd observation means is constituted by the 2nd objective lens 27, the 1st mirror 28, the relay optical system 29, the 30 or 2 image rotators reflecting prism 31, and said half prism 22, the image formation lens 24 and an ocular 25. The 2nd objective lens 27 in the 2nd observation means, the 1st mirror 28, and the relay optical system 29 are included in the tubing-like 2nd housing 32, and the member after it is built in said 1st housing 26. Here, the flux of light which carries out outgoing radiation from the relay optical system 29 is constituted so that it may become parallel light. Moreover, the flexible other end and the flexible lens 33 for lighting of a light guide 34 which were connected to the light equipment which does not illustrate an end are also built in the point of the tubing-like 2nd housing 32. Although being led through the 2nd housing 32 is desirable as for a light guide 34, it does not restrict to this.

[0010] Next, the migration device section of the 1st housing 26, and the tubing-like 2nd housing 32 is explained. The bearing 35 attached in said 1st housing 26 is minded, and the 1st gearing 36 is a revolving shaft O1 to the 1st housing 26. It is attached in the surroundings rotatable.

Moreover, as drawing 3 shows, the tubing-like 2nd housing 32 has penetrated in same axle, slot

32a is formed in the periphery of the 2nd housing 32 of the shape of said tubing in accordance with those shaft orientations, and projection 36a formed in the 1st gearing's 36 inside is engaging with the 1st gearing 36 at this slot 32a. For this reason, the 2nd housing 32 is said revolving shaft O1. It meets and is supported possible [a slide] up and down.

[0011] Here, the observation optical axis by which outgoing radiation is carried out from the relay optical system of said 2nd observation means is said revolving shaft O1. It has agreed. Moreover, the end part of the tubing-like 2nd housing 32 is the location which does not interrupt the observation flux of light of said 1st observation means, and is exposed out of the 1st housing 26 through hole 20a prepared in the part of the 1st objective lens 20.

[0012] Moreover, a bearing 39 is minded in the interior of the 1st housing 26, and it is a revolving shaft O2 to said 1st housing 26. The shaft 38 attached in the surroundings rotatable is formed, and it gets down, and is this revolving shaft O2. Said revolving shaft O1 Predetermined spacing is opened and it is arranged in parallel. Said 1st gearing 36 and the 2nd meshing gearing 40 are fixed to the lower limit section of a shaft 38, further, the 3rd gearing 41 is fixed to the pars intermedia of a shaft 38, and the 4th gearing 42 is being fixed to the upper limit section of a shaft 38.

[0013] It has geared with the 5th gearing 43, this 5th gearing 43 minds a bearing 44, and said 3rd gearing 41 is said revolving shaft O1 to the 1st housing 26. It is attached in the surroundings rotatable in same axle. Said image rotator 30 is attached in the interior of the 5th gearing 43 in same axle. Here, the speed ratio of the 1st gearing 36 and the 5th gearing 43 is set as 2 to 1. And a direction amendment means of an image to amend so that the sense of the observation image of an observed body may be maintained at the predetermined sense is constituted.

[0014] Said 4th gearing 42 meshes with the 6th gearing 45. The 6th gearing 45 minds a bearing 46 and is a revolving shaft O3 to said 1st housing 26. It is attached in the surroundings rotatable. Revolving shaft O3 Said revolving shaft O1 Said revolving shaft O2 Predetermined spacing is opened and it is arranged in parallel. Inside said 6th gearing 45, as shown in drawing 4, the index plate 47 which consists of a transparence plate with which the arrow head was printed is attached on the outskirts.

[0015] Here, the outgoing radiation optical axis of the image formation lens 24 of said 1st observation means has agreed with said revolving shaft O3, and said index plate 47 is arranged at the image formation point of the image formation lens 24. Moreover, the index plate 47 is arranged in order to agree with the direction to which the 2nd objective lens 27 seen from the way person at whom the direction of the printed arrow head is gazing through an ocular 25 points. The speed ratio of the 1st gearing 36 and the 6th gearing 45 is set as 1 to 1. On each optical axis between between one variable power optical system 21 and the half prism 22, the 2 times reflecting prism 31, and the half prism 22, the diaphragms 48 and 49 constituted in order to open either wide are inserted by the change lever which was exposed out of the 1st housing 26 and which is not illustrated.

[0016] Furthermore, the treatment implement guide 51 is attached in a part for the tubular point of the 2nd housing 32. The treatment implement guide 51 consists of treatment implement inlet-port 50a in the observation field of the 1st observation means, and treatment implement outlet 50b which leads the inserted treatment implement 52 to the observation field of the 2nd observation means. That is, a guidance means to guide a way implement etc. into the observation visual field of the 2nd observation means consists of inside of the observation visual field of the 1st observation means.

(Operation) First, when a way person observes with the 1st observation means, he slides the 2nd housing 32 in the direction of arrow-head C to the 1st gearing 36, and arranges in the condition of evacuating to a broken-line location. The change lever which is not illustrated with this is operated, one drawing 48 is opened wide, and the drawing 49 of another side is closed. Here, it is the way section P1. It is illuminated from the same lighting system as the well-known operation microscope built in the 1st housing 26.

[0017] then, the way section P1 the 1st objective lens 20 and each variable power optical system 21 -- a passage -- further -- one optical-axis side -- the half prism 22 -- a passage -- the optical-axis side of another side -- the brightness amendment filter 23 -- a passage --

respectively -- the image formation lens 24 -- minding -- respectively -- image formation -- it carries out and is observed by the eyes 53 and 54 of the way person of a Uichi Hidari pair through the ocular 25 of a pair. [in / in the emitted light / the 1st observation means] Observation with both eyes is made easy for the brightness amendment filter 23 to adjust the quantity of light lost by the half prism 22, to make the same brightness of an observation image on either side by the accommodation here, and to carry out.

[0018] On the other hand, with the 1st observation means, it is the way section P2 of a dead angle by the 2nd observation means. In observing, the 2nd housing 32 is slid below, and while arranging in the protrusion location shown as a continuous line, the change lever which is not illustrated is operated, one drawing 48 is closed, and it opens the drawing 49 of another side. Then, the illumination light emitted from the lighting system which is not illustrated is the way section P2 which serves as a dead angle with the 1st observation means through a light guide 34 and the lens 33 for lighting. It illuminates. Consequently, the way section P2 Image formation of the emitted light is carried out through the 2nd objective lens 27, the 1st mirror 28, the relay optical system 29, the 30 or 2 image rotators reflecting prism 31, the half prism 22, and the image formation lens 24, and it is observed by one eye 54 of a way person through the ocular 25 of one side. P1 according to said 1st observation means at one of other eyes 53 at this time While an image is observed, the arrow head of the index plate 47 arranged in the image formation location of the image formation lens 24 is observed, and a way person can grasp the check of the direction to which the 2nd objective lens 27 of the 2nd observation means points, i.e., the observation direction.

[0019] Next, the case where the visual field of the 2nd observation means is moved is explained. It is a shaft O1 about the 2nd housing 32. It is made to rotate around and the 2nd objective lens 27 is moved. If the 2nd housing 32 is rotated, since slot 32a and projection 36a currently formed in the 1st gearing 36 will be engaged, the 1st gearing 36 also rotates, and while the rotation is transmitted to the 5th gearing 43 through the 2nd gearing 40, a shaft 38, and the 3rd gearing 41, it is transmitted also to the 6th gearing 45 through the 4th gearing 42. Here, since the speed ratio of the 1st gearing 36 and the 5th gearing 43 is 2 to 1, the image rotator 30 built in the 5th gearing 43 always rotates only a half amount in the same direction as the 2nd housing 32. In drawing 1, the image which carries out incidence to the 2nd objective lens 27, and is observed by a way person's eye 54 through an ocular 25 by this is amended so that the surface side shown by the arrow head d may always serve as the fixed direction of the visual field of the 1st observation means. That is, it is a shaft O1 about the 2nd housing 32. Even if it makes it rotate around, the image rotator 30 is rotated and amended so that it may see from a microscope side, for example, a surface side may always be visible to the bottom.

[0020] Moreover, since the speed ratio of the 1st gearing 36 and the 6th gearing 45 is 1 to 1, the index plate 47 built in the 6th gearing 45 rotates only the always same amount as the same direction as the tubing-like 2nd housing 32. Therefore, the observation direction of the 2nd observation means can always be correctly grasped with the index.

[0021] When treatment is needed under observation by the 2nd observation means, a way person inserts only the tip of the flexible treatment implement 52 in treatment implement entry 50a of the treatment implement guide 51 under observation by the 1st observation means first. Next, after operating the change lever which is not illustrated and switching to observation by the 2nd observation means, the flexible treatment implement 52 is pushed. Then, since it exposes in the observation visual field of the 2nd observation means from treatment implement outlet 50b through the inside of the treatment implement guide 51, the tip of the treatment implement 52 can deal with a synechiotomy etc. easily.

(Effectiveness) In this example, since the 2nd observation means is built in in the 1st housing 26 in the form where the unnecessary clearance in the configuration of the conventional operation microscope is used, it can constitute in magnitude equivalent to the conventional operation microscope, and KOMPATO is easy to use. Moreover, it is made to evacuate so that it may not become obstructive when you undergo an operation only with the 1st observation means, since the 2nd objective lens 27 of the 2nd observation means is made to move toward the way section by sliding to the 1st observation means, and can set. Moreover, since the observation direction

of the 2nd observation means can always grasp with the index plate 47, it can improve the efficiency and effectiveness of an operation.

[0022] and in the former, although led to the dead angle part of an operation microscope, the tip of the treatment implement 52 First, until it draws the tip of the treatment implement 52 to near [said] a dead angle under observation by the operation microscope, next can observe the tip of the treatment implement 52 under observation by the dead angle observation means by an endoscope etc. Although the more prudent activity was required of the way person and it had been accompanied by fatigue since the treatment implement 52 was operated blindly It adds to having the 2nd observation means which observes the dead angle parts of the 1st observation means and the 1st observation means in this example. Since it is characterized by having the treatment implement guide 51 which prepared treatment implement inlet-port 50a observable within the observation visual field of the 1st observation means, a way person Only by inserting the tip of the treatment implement 52 in the treatment implement guide 51, and sending it out, the tip of the treatment implement 52 can be drawn in the observation visual field of the 2nd observation means, a prudent activity needs to be omitted, and there does not need to be little fatigue.

[0023] In addition, although the eye 53 explained the case where the image of the 1st observation means and an index lapped and it was visible, it constitutes so that the brightness of the brightness amendment filter 23 can be adjusted, and only the image by the 1st observation means may be made bright, or the image by the 1st observation means may be made dark, and the index plate 47 may be relatively made legible. Furthermore, while establishing a diaphragm of the 3rd between the variable power optical system 21 and the image formation lens 24, you may constitute so that a light guide may be carried out to this diaphragm of the 3rd from the light source section which is not illustrated between the index plates 47. In this case, in an eye 53, only an index plate is observable.

[0024] Moreover, you may enable it to observe on both sides of an eye 53 and an eye 54 by constituting the 1st reflector of the 2 times reflecting prism 31 so that it may become reflection and 50% transparency 50%, and arranging the 2nd half prism above a reflecting prism 31 twice [this] the 2nd 2 times reflecting prism and on an eye 53 side optical axis. In this case, since it is observable by both eyes, fatigue of an eye decreases in observation of long duration.

The 2nd example of this invention is explained with reference to <2nd example> drawing 5 .

(Configuration) In drawing 5 , 59 is the 1st housing of the mirror body which contains the same observation optical system as the 1st observation means in the 1st example. The in-the-living-body insertion section in which 60 contains the 2nd objective lens 61 and the 2nd ocular 62 is a flexible endoscope, and the 2nd observation means is constituted from half prism 22 which the relay optical system 63 and the 64 or 2 image rotators reflecting prism 65 are incorporated in the 2nd housing 66, and stated in the 1st example mentioned above with these, an image formation lens 24, and an ocular 25 by the hand flank of an endoscope 60. Here, although the relay optical system 63 and the 64 or 2 image rotators reflecting prism 65 are built in in the 2nd housing 66, the member by the side of slack transmission back is built in said 1st housing 59 after that from it. Moreover, the flexible light guide 67 connected to the light equipment which does not illustrate an end, the lens for lighting which is not illustrated, and the flexible treatment implement 100 are inserted in this endoscope 60, and the channel 101 which shows the tip of that treatment implement 100 into the observation visual field of the 2nd observation means is built in it.

[0025] Furthermore, the circumference parts of the 2nd housing 66 and the 1st housing 59 are stated to a detail. The 2nd housing 66 has fixed in the location like illustration of the 1st housing 59 so that the flux of light reflected twice by the reflecting prism 65 may carry out incidence to the half prism 22. The image rotator 64 fits into the inner circumference of the 2nd housing 66, and is a revolving shaft O4 to the 2nd housing 66. It is attached in the around rotatable cylinder member 68 in same axle. 69 is a cylindrical shape attachment component, this fits into the periphery of the 2nd housing 66, and it is a revolving shaft O4 to the 2nd housing 66. It is attached in the surroundings rotatable. Like illustration, while the relay optical system 63 is attached, the fixed knob 70 for holding an endoscope 60 is thrust into the interior of this cylindrical shape attachment component 69 free [bolting].

[0026] Here, the observation optical axis which results in a reflecting prism 65 twice from an endoscope 60 is said revolving shaft O4. It has agreed. In the 2nd housing 66, it is said revolving shaft O4. The cam groove 74 on a straight line is formed in parallel, and the cam groove 75 which is each other interwoven with in a cam groove 74 is formed in the cylinder member 68. Furthermore, the cam groove 76 which is each other interwoven with in a cam groove 74 is formed also in the cylindrical shape attachment component 69. The direct-acting member 71 is engaging with the cam groove 74, and the cam pins 77 and 78 which engage with cam grooves 75 and 76, respectively have fixed to the direct-acting member 71 at it. Here, cam grooves 75 and 76 are revolving shafts O4 to the 2nd housing 66 about the cylindrical shape attachment component 69. When it is made to rotate around, the cylinder member 68 is a revolving shaft O4. It is constituted so that only one half of the rotations of the cylindrical shape attachment component 69 may be rotated around.

(Operation) When a way person observes with the 1st observation means, since it is the same as the operation of those other than the part which described the tubing-like 2nd housing 32 in the 1st example mentioned above, it omits.

[0027] Next, when a way person observes the dead angle of the 1st observation means with the 2nd observation means, the switch lever which is not illustrated is operated, and while closing diaphragm 48, it extracts, and 49 is opened. The light emitted from the light equipment which is not illustrated is a light guide 67 and the way section P2 which serves as a dead angle of the 1st observation means through the lens for lighting which is not illustrated. It illuminates. Way section P2 Image formation of the emitted light is carried out through an endoscope 60, the 2nd ocular 62, the relay optical system 63, the 64 or 2 image rotators reflecting prism 65, the half prism 22, and the image formation lens 24, and it is observed by one eye 53 of a way person through the ocular 25 of one side. At this time, the image by the 1st observation means is observed as well as the 1st example by the eye 54 of another side.

[0028] When moving the visual field of the 2nd observation means, it is a revolving shaft O4 about the cylindrical shape attachment component 69. It is made to rotate around and an objective lens 61 is moved. If the cylindrical shape attachment component 69 is rotated, cam grooves 74, 75, and 76, the direct-acting member 71, and the image rotator 64 attached in the interior of the cylinder member 68 according to an operation of cam pins 77 and 78 will rotate only one half of the rotations of the cylindrical shape attachment component 69. As well as the 1st example, the image which carries out incidence to an objective lens 61, and is observed by a way person's eye 53 through an ocular 25 by this is amended so that the surface side shown by the arrow head e in drawing 5 may always serve as the fixed direction of the visual field of the 1st observation means.

[0029] When treatment is needed under observation by the 2nd observation means, a way person inserts the flexible treatment implement 100 in a channel 101, and pushes under observation by the 2nd observation means. Then, since the tip of the treatment implement 100 passes along the inside of a channel 101 and exposes it in the observation visual field of the 2nd observation means, it can deal with a synechiotomy etc.

(Effectiveness) Since the conventional endoscope can be used for a part of 2nd observation means according to this example, the endoscope of the optimal size and die length can be chosen by the technique. Moreover, since the flexible endoscope was used for a part of 2nd observation optical system, the degree of freedom of the observation location by the 2nd [to the 1st observation means] observation means is high.

[0030] It adds to having the 2nd observation means which observes the dead angle parts of the 1st observation means and the 1st observation means in this example. And for a part of 2nd observation means Since the endoscope with which the channel 101 which inserts in the flexible treatment implement 100 and shows the tip into the observation visual field of the 2nd observation means is built in can be used, a way person The tip of the treatment implement 100 can be drawn in the observation visual field of the 2nd observation means, a prudent activity is omitted, and there is little fatigue and it can be managed only with inserting the treatment implement 100 in a channel 101, and sending it out.

The 3rd example of this invention is explained with reference to <3rd example> drawing 6 .

Drawing 6 is the sectional view showing the configuration at the time of using an image guide for the 2nd observation means.

(Configuration) Since the flexible image guide 80 is used without using mirrors, such as the 64 or 2 image rotators reflecting prism 65 in the 2nd example, this example is explained focusing on a different part from the 2nd example. 81 is the support formed in the 1st housing 59, and is [as opposed to / in this support 81 / this support 81] a revolving shaft O5. The attachment component 82 is attached in the surroundings rotatable. The fixed knob 70 for holding the endoscope 60 with which it is equipped with the 2nd ocular 62, enabling free attachment and detachment is thrust into the attachment component 82. According to the image formation location of said image formation lens 102, the end of said image guide 80 has fixed the attachment component 82 while the image formation lens 102 is attached in the interior.

[0031] The other end of said image guide 80 has fixed to the insertion holder 83 of a cylindrical shape, and the relay lens 103 is attached in the interior of this insertion holder 83 that the flux of light from said image guide 80 should be made parallel light. Furthermore, maintenance immobilization is carried out in the condition which can be freely detached and attached by pressing down said slot 104 by the tip of the fixed knob 73 after inserting in the location like illustration of the 1st housing 59 so that, as for the insertion holder 83, the slot 104 may be formed in the periphery section and the outgoing beam of a relay lens 103 may carry out incidence to said half prism 22.

[0032] (Operation) Here, the same thing as the operation in the 2nd example mentioned above will be omitted, and will be described focusing on a different point.

[0033] Way section P2 After it carries out image formation of the emitted light through an endoscope 60, the 2nd ocular 62, and the image formation lens 102 and it minds an image guide 80, it is made into parallel light through a relay lens 103, carries out image formation through the half prism 22 and the image formation lens 24, and is observed by one eye 53 of a way person through the ocular 25 of one side.

[0034] When moving the visual field of the 2nd observation means, it is a revolving shaft O5 to support 81 about an attachment component 82. If it is made to rotate around, the flexible image guide 80 will rotate by one, and by the ability twisting an image guide 80, it is amended so that the surface side shown by the arrow head f in drawing 6 may always serve as the fixed direction of the visual field of the 1st observation means as well as the 1st example.

(Effectiveness) In this example, since in addition to the effectiveness of the 2nd example mentioned above the 2nd housing can be removed from the 1st housing when observation by the 2nd observation means is unnecessary, it does not become the hindrance of an operation.

[0035] In addition, even if it transposes to the TV monitor 91 which is a means display the image picturized by the image pick-up equipment which consists of CCU which is not illustrated and said image pick-up equipment for making into a video signal TV camera 90 which contained CCD which does not illustrate the image guide 80 in this example as shown in drawing 7, and the electrical signal from said CCD, it cannot be overemphasized that the same effectiveness is acquired.

The 4th example of this invention is explained with reference to <4th example> drawing 8 and drawing 9.

(Configuration) Drawing 8 shows the overall configuration of the mirror body section. In this drawing 8, 110 is the 1st housing and builds the observation means of ** the 1st which it extracts and is the same observation optical system except for 48, 49, the half prism 22, and the brightness amendment filter 23 except it shown in drawing 1 from the 1st observation means stated in the 1st example in this 1st housing 110. As for 111, the 2nd observation means consists of [a total reflection mirror and 114 / an image rotator and 115] 1st observation means 20, i.e., the 1st objective lens, by which an image formation lens and 116 are the 2nd half mirror, and are built in the 1st housing 110 with these, variable power optical system 21 of a pair, an image formation lens 24 of a pair, and an ocular 25 of a pair for the 1st half mirror and 113, as for the 2nd objective lens and 112. Moreover, 117 is the light source connected to the power source which is not illustrated, and the arrangement configuration is carried out so that the way section observed with the 2nd objective lens through the 1st half mirror 112 and the 2nd

objective lens 111 may be illuminated. Moreover, the 2nd half mirror 116 is built in the 2nd housing 118 from the 2nd objective lens 111.

[0036] Next, when the structure of the applied part in which attachment and detachment with the 1st housing 110 and the 2nd housing 118 are free is described, 119 is a revolving shaft O7 to the 1st housing 110. It is the supporter attached in the surroundings free [rotation], and 120 is a gage pin which has fixed to said supporter 119. Moreover, the supporter 119 forms V groove 121 in the periphery. On the other hand, when said supporter 119 is equipped with said 2nd housing 118, while the slot 123 where said gage pin 120 is engaged is formed, the fixed knob 122 is thrust into the 2nd housing 118 by the location where a tip can engage with said V groove 121. The encoder 132 which is not illustrated is attached between the 1st housing 110 and a supporter 119. 124 is the stepping motor which fixed in the 2nd housing 118. 125 is a transfer gearing and has fixed at the shaft of said stepping motor 124. 126 is a shaft O8 to the 2nd housing 118 by the bearing which is not illustrated. It is said transfer gearing 125 attached in the surroundings rotatable, and the meshing gearing, and said image rotator 114 is attached in the interior.

[0037] When the configuration of an electrical circuit until it results [from an encoder 132] in a stepping motor 124 is explained here according to the block diagram shown in drawing 9, 127 is a rotation detecting element which detects the rotation of the supporter 119 to the 1st housing 110 according to the electrical signal from an encoder 132. 128 is a control section which takes out a driving signal to the power supply section 129 which drives said stepping motor 124 according to the rotation detected in the rotation detecting element 127. Here, the gearing 126 is controlled to rotate only one half to the 1st housing 110 of the rotations of the rotation of the 2nd housing 118.

[0038] Moreover, shaft O8 It has agreed with the optical axis after the optical axis of the 2nd objective lens 111 was reflected by the 1st half mirror 112 and the total reflection mirror 113. 130,131 is the diaphragm constituted in order to open either wide by the change lever which was exposed out of the 2nd housing 118, and which is not illustrated.

(Operation) When a way person observes with the 1st observation means, the change lever which is not illustrated is operated, one drawing 130 is closed, and the drawing 131 of another side is opened. Then, it is the way section P1 by the same operation as the 1st example mentioned above. After the emitted light penetrates the 2nd half mirror 116, it is observed by a way person's eyes 53 and 54 through the 1st objective lens 20, the variable power optical system 21 of a pair, the image formation lens 24 of a pair, and the ocular 25 of a pair.

[0039] In observing the back sense direction of the image obtained by the 1st observation means with the 2nd observation means, the change lever which is not illustrated is operated, and conversely, one drawing 130 is opened wide and it closes the drawing 131 of another side. Then, the illumination light emitted from the light source 117 is the side face P2 of the way section observed by the 1st observation means through the 1st half mirror 112 and the 2nd objective lens 111. It illuminates. Way section P2 Image formation of the emitted light is once carried out through the 2nd objective lens 111, the 1st half mirror 112, a total reflection mirror 113, the image rotator 114, and the image formation lens 115, and the part of the back sense direction is further observed by a way person's eyes 53 and 54 through the 1st objective lens 20, the variable power optical system 21 of a pair, the image formation lens 24 of a pair, and the ocular 25 of a pair through the 2nd half mirror 116.

[0040] Next, it is [as opposed to / when moving the visual field of the 2nd observation means / the 1st housing 110] a shaft O7 about the 2nd housing 118. It is made to rotate until it becomes the desired observation direction around. Then, according to the electrical signal from the encoder 132 which is not illustrated, the rotation of the supporter 119 to the 1st housing 110 is detected by the rotation detecting element 127, and a signal is sent to a control section 128. A signal is taken out with a control section 128 to a power supply section 129 that said stepping motor 124 should be driven according to the rotation detected in the rotation detecting element 127. A power supply section 129 drives a stepping motor 124 according to the signal from a controller 128. Through the transfer gearing 125, rotation of a stepping motor 124 is transmitted to a gearing 126, and the image rotator 114 attached in the interior of a gearing 126 rotates it.

Here, a gearing 126 and the image rotator 114 are one, and since it rotates only one half of the rotations to the 1st housing 110 of the 2nd housing 118, the image observed by a way person's eyes 53 and 54 is amended so that the surface side expressed with an arrow head h in drawing 7 may always serve as the fixed direction of the visual field of the 1st observation means.

[0041] (Effectiveness) According to this example, it is possible to observe the perimeter of the way section which is observing with the 1st observation means and is carrying out the ***** protrusion. Moreover, since solid observation is possible not only for the 1st observation means but the 2nd observation means, it is easy to conduct an operation on the top where the focal distance of the 2nd observation means is long. This invention is not limited to the thing of the example mentioned above, and can consider various modifications.

According to the explanation which carried out the [additional remark] above-mentioned, the thing of the mode of each term like a less or equal is included.

The 1st observation means which consists of the observation optical system for observing the way section, (Additional remark 1) The 2nd observation means which shares the eye contacting part of said 1st observation means while observing the part of said observed body in the condition that the sense which observes an observed body with this 1st observation means differs either [at least] from a location, The operation microscope characterized by providing a direction amendment means of an image to amend so that the sense of the observation image of the observed body in said eye contacting part obtained with a scrolling means to change the line of sight of this 2nd observation means, and said 2nd observation means may be maintained at the predetermined sense (the 1st, 2, 3, and 4 example).

A scrolling means to move a visual field by making it rotate to the circumference of an parallel shaft is constituted. (Additional remark 2) the objective lens of said 2nd observation means — the observation optical axis of said 1st observation means, and abbreviation — The image obtained by said 1st observation means in said eye contacting part For example, when the depth direction is defined in the specific direction of a visual field, The observation image obtained by said 2nd observation means, The operation microscope which consists of an amendment means to amend the sense of the image obtained by said 2nd observation means observed by said eye contacting part that the depth direction seen from said 1st observation means should always agree with said specific direction (the 1st, 2, 3, and 4 example).

(Additional remark 3) Said 1st observation means is an operation microscope (the 1st, 2, 3, and 4 example) given in the additional remarks 1 and 2 characterized by having the observation optical system which performs solid observation.

(Additional remark 4) The observation sense to the observed body of said 1st observation means and said 2nd observation means is an operation microscope (the 1st, 2, 3, and 4 example) given in the additional remarks 1, 2, and 3 characterized by carrying out an abbreviation rectangular cross.

(Additional remark 5) An operation microscope given in the additional remarks 1, 2, 3, and 4 characterized by having held said 1st observation means in the 1st housing, having held said a part of 2nd observation means [at least] in the 2nd housing, and enabling the attitude of said 2nd observation means in accordance with the observation optical axis of said 1st observation means (the 1st, 2, 3, and 4 example).

(Additional remark 6) An operation microscope given in the additional remarks 1, 2, 3, 4, and 5 characterized by having used the endoscope for said 2nd observation means, and attaching this endoscope free [attachment and detachment] to other members (the 2nd and 3 example).

(Additional remark 7) Said direction amendment means of an image is an operation microscope (the 1st, 2, and 4 example) given in the additional remarks 1, 2, 3, 4, 5, and 6 characterized by having the image rotator which rotates with one half of the numbers of rotations to rotation of the 2nd observation means.

(Additional remark 8) Said 2nd observation means is an operation microscope (the 4th example) given in the additional remark 1 characterized by consisting of image formation optical system which carries out image formation of the image of the way section to the focus of said 1st observation means in a location [****].

(Additional remark 9) Said amendment means is an operation microscope (the 3rd example) given

in claims 1, 2, 3, 4, 5, 6, 7, and 8 characterized by consisting of a display means to display the image picturized by the image pick-up equipment which rotates united with said 2nd objective lens, and said image pick-up equipment attached in immobilization to said eye contacting part. (Additional remark 10) Said amendment means is claim 1 characterized by being the image guide which consists of an incidence end face which rotates united with said 2nd objective lens, and an outgoing radiation end face attached in immobilization to said eye contacting part thru/or an operation microscope (the 3rd example) given in 8.

The part of the body observed by the 1st observation means which consists of the observation (stereo) optical system for observing the way section, and this 1st observation means is observable in the another sense or an another location. (Additional remark 11) And it sets to the operation microscope which consists of the 2nd observation means which shares an eye contacting part with said 1st observation means at least. The operation microscope characterized by establishing a guidance means to guide a way implement etc. into the observation visual field of the 2nd observation means, from the inside of the observation visual field of the 1st observation means (the 1st, 2nd, and 3rd example).

[0042]

[Effect of the Invention] According to the operation microscope of this invention, as explained above, since a way person can grasp easily the physical relationship on the anatomy of the observation image by the 1st observation means, and the observation image by the 2nd observation means, under the microscope, he can change a microscope image and an endoscope image suitably, and can raise the efficiency at the time of undergoing an operation, while the way section observes.

[Translation done.]